

Solve:

- 1) What is $\frac{d}{dx} \operatorname{arccot}(4x - 2)$?

$$= \frac{-1}{1+u^2} \cdot u'$$

$$= \boxed{\frac{-4}{1+(4x-2)^2}}$$

$$u = 4x - 2 \\ u' = 4$$

- 2) What is the derivative of $t(x) = \sec^{-1}(-2x + 2)$?

$$\frac{1}{|u|\sqrt{u^2-1}} \cdot u'$$

$$= \boxed{\frac{-2}{|-2x+2|\sqrt{(-2x+2)^2-1}}}$$

$$u = -2x + 2 \\ u' = -2$$

- 3) Given $q(x) = \cos^{-1}(-5x - 2)$. What is $q'(x)$?

$$= \frac{-1}{\sqrt{1-u^2}} \cdot u'$$

$$= \boxed{\frac{5}{\sqrt{1-(-5x-2)^2}}}$$

$$u = -5x - 2 \\ u' = -5$$

- 4) Given $g(x) = \cos^{-1}(x)$.

What is $\frac{dg}{dx}$?

$$\boxed{\frac{-1}{\sqrt{1-x^2}}}$$

- 5) What is the derivative of $w(x) = \arctan(-3x^2 - 4)$?

$$\frac{1}{1+u^2} \cdot u'$$

$$= \boxed{\frac{-6x}{1+(-3x^2-4)^2}}$$

$$u = -3x^2 - 4 \\ u' = -6x$$

- 6)

$$\int \frac{1}{x^2 + 1} dx =$$

$$\boxed{\tan^{-1} x}$$

- 7)

$$\int \frac{1}{|x|\sqrt{x^2-1}} dx =$$

$$\boxed{\sec^{-1} x}$$